

Young mothers' attitudes towards domestic violence and their maternal healthcare services utilization in Bangladesh: A multilevel cluster analysis

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Abstract:	This paper examined the association between young mother's attitudes towards domestic violence and four or more antenatal care (ANC) and health-center-based delivery service utilization along with cluster variation using two waves of Bangladesh Demographic and Health Survey (2014 and 2018) data. Multilevel logistic regression results show that a strong cluster variation exists in four or more ANC and health-center-based delivery service utilization. Although the utilization of four or more ANC and health-center-based delivery services has increased over the years, it is far behind the targets of SDGs, particularly for young mothers with justified attitudes towards domestic violence. Extension of maternity allowance coverage and motivational programs are important policy recommendations.
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Data files for this survey are open to access and use through the DHS program website. USAID. The Demographic and Health Survey ICF, Rockville, Washington, D.C., USA: United States Agency for International Development; 2020 [cited 2020 8 august]. Available from: <https://dhsprogram.com/data/available-datasets.cfm?fbclid=IwAR1H7zsRnld8cmR2kwd8fD-p2XDP7gQrXAd-oOozKQdHiq7VpLUMDPLxM2c>.

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Young mothers' attitudes towards domestic violence and their maternal healthcare services utilization in Bangladesh: A multilevel cluster analysis

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1 **Young mothers' attitudes towards domestic violence and their maternal healthcare services**
2 **utilization in Bangladesh: A multilevel cluster analysis**
3

4 **Abstract**

5 This paper examined the association between young mother's attitudes towards domestic violence
6 and four or more antenatal care (ANC) and health-center-based delivery service utilization along
7 with cluster variation using two waves of Bangladesh Demographic and Health Survey (2014 and
8 2018) data. Multilevel logistic regression results show that a strong cluster variation exists in four
9 or more ANC and health-center-based delivery service utilization. Although the utilization of four
10 or more ANC and health-center-based delivery services has increased over the years, it is far
11 behind the targets of SDGs, particularly for young mothers with justified attitudes towards
12 domestic violence. Extension of maternity allowance coverage and motivational programs are
13 important policy recommendations.

14
15 **Keywords:** Antenatal care, Delivery care, Domestic violence, Young mothers, Cluster analysis,
16 Bangladesh

17 **Introduction**

18 Assurance of healthy lives for all is one of the commitments of the Sustainable Development Goals
19 (SDGs), the blueprint for building a better world for the next generation. In achieving equity in the
20 health systems, a reduction in maternal mortality is greatly desirable which can be ensured through
21 access to and use of quality antenatal care (ANC) and health-center-based delivery care. Utilization
22 of four or more ANC and health-center-based delivery care is an important WHO-recommended
23 strategies to reduce preventable maternal mortalities and their morbidities (1-3). Moreover, young
24 mothers have a greater risk to experience maternal mortality due to their limited access to four or
25 more ANC and health-center-based delivery care compared to adult mothers (4-7). Previous
26 studies have identified several barriers of four or more ANC and health-center-based delivery
27 service utilization related to demographic and socio-economic aspects of the population. Apart
28 from these, the association of behavioral factors, especially the attitudes of young mothers towards
29 domestic violence and access to four or more ANC and health-center-based delivery care need to
30 be explored as it has become a burning issue over the world now-a-days. The international
31 community has also been committed to ending all forms of violence against all women and girls
32 by 2030 under SDG-5 (Target 5.2) (8).

33
34 In 2019, countries from all around the world participating in the International Conference on
35 Population and Development (ICPD+25) initiated an integrated approach to attain triple zero in
36 terms of unmet need for contraception, preventable maternal deaths, and gender-based violence
37 and harmful practices (9). Globally, 35.0% of women have endured sexual or physical violence by
38 their intimate and or non-intimate partner (10). Around 23.2% of women from wealthy countries
39 and 37.7% of women from South East Asian countries including Bangladesh have experienced
40 various forms of violence at different stages of their life-cycle (11). Violence against women
41 adversely affects their physical and mental health because most abused women are less capable to
42 care for themselves and their offspring (12, 13). Evidence also suggested that in developing
43 countries like Bangladesh domestics violence against women during pregnancy decreased their
44 consumption of nutritious foods which in the long run affect their pregnancy outcomes by
45 increasing the likelihood of miscarriage, preterm birth, stillbirth, underweight at birth, and deaths
46 followed by maternal mortality and morbidity (4, 14-23). Domestic violence against women causes

disempowerment, particularly for young women (24, 25) which ultimately limits their access to four or more ANC and health-center-based delivery care.

Bangladesh government has been implementing several initiatives such as a community-based skilled birth attendant program, maternity allowance (MA) program, basic and comprehensive emergency obstetric care, active management of pregnancy complications, establish women's friendly hospital, etc. to improve maternal healthcare services utilization, targeting to reach 50% four or more ANC and 65% health-center-based delivery by 2022 (26) and four or more ANC and health-center-based delivery 98% by 2030 (27). Under the MA program, each selected poor woman received an amount of TK 800.0 equivalent to 9.52 US\$ per month for three years since gestation to purchase health care and nutrient foods for themselves and also for their children (28). Although the utilization rate has increased in 2017-18 (referred to 2018 onward) compared to 2014, yet only 47% of mothers in Bangladesh received four or more ANC and 49% of them delivered their last child's birth at a health-center in 2018 (29). Such a pattern of using four or more ANC and health-center-based delivery care in Bangladesh is largely associated with women's lower social position, lower level of education and financial condition, and inadequate sense about their rights (30-33). While the unavailability, inaccessibility, and unaffordability are strongly correlated with lower utilization of four or more ANC and health-center-based delivery services among Bangladeshi women, the association of domestic violence with antenatal and delivery care services utilization is less studied in the context of Bangladesh (31, 34-36).

Socio-cultural norms and gender roles typically shape Bangladeshi women's domestic violence accepting attitudes (36, 37). In Bangladesh, at least three in every five women experienced physical or sexual violence and one in five women justified wife-beating by their husbands (32, 38-40). Therefore, understanding the effects of domestic violence on young mothers' four or more ANC and health-center-based delivery service utilization is important for developing effective maternal healthcare policies and interventions.

The association between domestic violence and the lower utilization of four or more ANC and health-center-based delivery care receives less attention previously. Earlier studies focused on either utilization of any ANC or violence caused by an intimate partner (36). Moreover, the

situation of ANC and health-center-based delivery care for young mothers, particularly those aged 15-24 years, remains unexplored as previous studies mostly considered women of all age groups (25, 36-38). Also, the variations in the use of four or more ANC and health-center-based delivery by clusters are not considered in the past literature. In the context of Bangladesh, neither has existing studies considered domestic violence towards young mothers and its implication on using four or more ANC and health-center-based delivery care nor appropriate statistical models have been used to reveal the cluster variations (41). Moreover, to our knowledge, no such studies yet used the recent two waves of BDHS data (2018 and 2014) for comparing the utilization of four or more ANC and health-center-based delivery services by women's attitudes towards domestic violence in Bangladesh. The findings of this study may contribute developing countries like Bangladesh, which contains a large portion (28%) of ever-married young women (29). More specifically, a better understanding of the effect of several covariates along with cluster variation which is examined in this study may assist the policymakers to execute the intervention programs targeting to increase the utilization of WHO-recommended four or more ANC and health-center-based delivery services for young mothers in a planned way.

Materials and Methods

Data Source

The Demographic Health Survey (DHS) was performed in 85 developing nations including Bangladesh measuring the progress of population health and nutritional status. Since 1993, this survey has been conducted in Bangladesh in three-year intervals by the National Institute of Population Research and Training (NIPORT) of the Ministry of Health and Family Welfare (39). Data files for this survey are open to access and use through the DHS program website (42). This study used data from the recent two waves of Bangladesh Demographic and Health Surveys (BDHS), 2014 and 2018 (29, 39).

Sampling design

The BDHS was guided by a two-stage stratified cluster sampling for the household survey (29, 39). The sampling framework of this survey was developed using the total list of enumeration areas (EAs) covering the entire country of the most recent census developed by the Bangladesh Bureau of Statistics (BBS). EAs are defined as geographic areas having an average of 120

households in each (43). In the first stage, EAs were selected with probability proportional to the size of EA. In the second stage, using a systemic sampling procedure a certain number of households on average were selected from each EA with an equal probability to provide statistically valid estimates of health-related national-level indicators within the subgroups of divisions and place of residence. Ever-married women aged 15-49 years were interviewed for this survey to evaluate the utilization pattern of maternal healthcare services. The details of the sampling design of BDHS 2014 and BDHS 2018 are described elsewhere (29, 39).

Study Population

This study considered only currently married young mothers, aged 15-24 years who had a recent live birth in three years preceding the survey (44). This allowed 2431 observations from BDHS 2014 and 2599 observations from BDHS 2018, after extracting and cleaning data available for the study. Among the studied young mothers, 32.4% of them in BDHS 2014 whereas 48.3% among them in BDHS 2018 took four or more ANC visits. Moreover, 40.1% of young mothers delivered their recent birth at a health-center in BDHS 2014 and 51.7% of them received health-center-based delivery care in BDHS 2018.

Variables' Characteristics

Outcome variables

The study considered two binary outcome variables as indicators of maternal healthcare services utilization. The first outcome variable, utilization of four or more ANC visits categorized into two: 'yes' refers to those who had four or more ANC visits, and 'no' refers to those who took zero to three ANC visits. The second outcome variable is the place of delivery (PoD) which indicates whether the births were delivered at home or under a health center. If the birth took place at any health center, it is recorded as 'health center-based delivery' and if the birth was delivered at home then it is recorded as 'home-based delivery'.

Independent variables

The prime focus of this study is on the independent variable 'young mothers' attitude toward domestic violence'. A composite variable was measured through young mothers' attitudes towards justification of wife-beating or hitting by their husbands, which was grounded by their responses

to five questions: 1) if she burns the food, 2) if she argues with husband, 3) if she goes out without telling husband, 4) if she neglects the children, and 5) if she refuses to have sexual intercourse with husband. However, this variable for analysis purposes was coded into two categories: (1) ‘favorable’ refers to those who justified domestic violence with at least one of the above reasons, and (2) ‘opposed’ refers to otherwise.

A range of socio-economic, and demographic variables was also included in the multivariate analysis. The variable region was coded into seven divisions for BDHS 2014: (1) Barisal, (2) Chittagong, (3) Dhaka, (4) Khulna, (5) Rajshahi, (6) Rangpur, and (7) Sylhet (39). Mymensing is added as another administrative area along with these divisions in BDHS 2018(29). Place of residence was coded into two: (1) rural, and (2) urban. Households’ wealth index was coded into three: (1) poor, (2) middle, and (3) rich. Educational status of young mothers and their husbands was coded into three categories: (1) no education, (2) primary who completed grade five, and (3) secondary who completed grade 10, and (4) higher who attained above the secondary level education. The respondent is described to have access to the media if she read a newspaper or magazine/watched television/listened to the radio. Media exposure was classified into two: (1) ‘yes’ and (2) ‘no’. Young mothers’ decision-making capacity was coded into two: (1) ‘yes’, and (2) ‘no’. If any respondent took part in making decisions solely or partially at least one of the issues related to own healthcare, key household purchases, and visit her family members or relatives are categorized as “yes” in young mothers’ autonomy variable and vice versa. The working status of mothers was categorized as (1) employed, and (2) unemployed. Birth order was classified into two: (1) first birth, and (2) others.

Statistical Analyses

As the BDHS survey follows a two-stage stratified clustering sampling procedure, the two-level multilevel logistic model uses to examine the cluster effect among young mothers, and the random effect component is introduced for each cluster as the young mothers are nested into the clusters (45, 46). The measures of association between two outcome variables and covariates are assessed through chi-square tests. The independent variables that were significantly associated with the outcome variables are included in the regression model. For each of the two outcome variables,

two models are considered- a null model without any explanatory variables and a complete model with all covariates.

Suppose Y_{ij} be the binary outcome variable for j^{th} individual in i^{th} cluster where $j = 1, 2, \dots, n_i$ and $i = 1, 2, \dots, k$. Let $x_{ij} = (x_{ij1}, x_{ij2}, \dots, x_{ijp})'$ be the $p \times 1$ vector of independent variables for j^{th} individual in i^{th} cluster and $\beta = (\beta_1, \beta_2, \dots, \beta_p)'$ be the $p \times 1$ vector of regression parameters. Then multilevel logistic regression can be written as

$$\ln \frac{\pi_{ij}}{1 - \pi_{ij}} = x'_{ij}\beta + u_i$$

Where $\pi_{ij} = E(Y_{ij}|u_i)$ and u_i is random intercept where $u_i \sim N(0, \sigma_u^2)$. In this setup, the fixed effect of covariates can be expressed through adjusted odds ratio, and random effect can be revealed through intra-cluster correlation (ICC) which means correlation among individuals within the same cluster. The denoted ρ can be measured by the variance component of random intercept that is $\rho = \frac{\sigma_u^2}{\sigma_u^2 + \frac{\pi^2}{3}}$ (47).

Results

The distribution of young mothers aged 15-24 years by background characteristics presented in Table 1 shows that the percentage of young mothers with four or more ANC visits was increased by about 16% (32.4% in 2014 and 48.3% in 2018) and health-center-based delivery was increased by about 12% (40.1% in 2014 and 51.7% in 2018) over the years. Young mothers' opposing attitudes towards domestic violence was also increased by 9.4%, from 72.7% in 2014 to 82.1% in 2018. Whilst, the proportion of poor young mothers was increased over the years, the proportion of rich young mothers was reduced. The percentage of young mothers and their husbands had no education was decreased and a higher level of education for both of them was increased between 2014 and 2018. The percentage of young mothers with access to media was also increased over the years. Moreover, young mothers' decision-making capacity was increased by 11.5% and the proportion of employed young mothers was increased by about 15% between 2014 and 2018. The proportion of first birth order was higher for young mothers in both years.

197 Table 1: Distribution of several characteristics of young mothers aged 15-24 years in Bangladesh, BDHS 2014 and
198 2018

Characteristics	BDHS 2014 (n=2431)	BDHS 2018 (n=2599)
<i>At least 4 ANC</i>		
Yes	32.4	48.3
No	67.6	51.7
<i>Place of Delivery (PoD)</i>		
Health-center-based	40.1	51.7
Home-based	59.9	48.3
<i>Attitude towards domestic violence</i>		
Favorable	27.3	17.9
Opposed	72.7	82.1
<i>Division</i>		
Barisal	11.8	11.1
Chattogram	19.5	16.7
Dhaka	16.6	14.4
Khulna	12.4	10.7
Rajshahi	12.9	10.9
Rangpur	13.0	11.0
Sylhet	13.9	13.1
Mymensingh*	-	12.2
<i>Place of residence</i>		
Rural	68.3	67.7
Urban	31.7	32.3
<i>Wealth index</i>		
Poor	40.4	43.1
Middle	19.7	19.0
Rich	39.9	37.9
<i>Young mothers' educational level</i>		
No Education	7.2	3.6
Primary	27.9	25.4
Secondary	54.5	52.1
Higher	10.3	18.9
<i>Husband's educational level</i>		
No Education	35.2	30.3
Primary	45.0	46.1
Secondary	7.2	6.0
Higher	12.6	17.6
<i>Access to media</i>		
No	36.3	35.8
Yes	63.7	64.2
<i>Decision-making capacity</i>		
No	31.8	20.3
Yes	68.2	79.7
<i>Working status</i>		
No	83.2	68.5
Yes	16.8	31.5
<i>Birth order</i>		
Otherwise	35.2	37.6
First birth	64.8	62.4

199 * Mymensingh division has been included in BDHS 2018 wave as a separate division.

The overall utilization rates of four or more ANC visits and health-center-based delivery care among young mothers was increased between 2014 and 2018. However, the utilization rate was strikingly low for young mothers who had justified attitudes towards the reasons for domestic violence than those who had opposite attitudes, which indicate the negative effects of domestic violence on young mothers' utilization of four or more ANC and health-center-based delivery care (Table 2). It also shows that four or more ANC (29.5% in 2014 and 41.8% in 2018) and health-center-based delivery (30.4% in 2014 and 38.2 % in 2018) service utilization rates among young mothers who had justified attitudes towards domestic violence if a woman goes out without telling her husband were far behind the targets of Bangladesh's 4th Health, Population and Nutrition Sector Program (HPNSP) and Sustainable Development Goals (SDGs). Though the utilization rates of four or more ANC and health-center-based delivery care for young mothers who had justified attitudes towards the other reasons of domestic violence such as: if she neglects the children, argues with her husband, refuses to have sex with her husband, and burnt food were increased in 2018 than that were in 2014 but it tended to lag behind the aforementioned targets.

Table 2: Percentage distribution of four or more ANC and health-center based delivery utilization among young mothers who have recent birth by reasons for domestic violence according to BDHS 2014 and 2018

Domestic violence by husband is justified if women	% received at least 4 ANC		% delivered birth at a health-center	
	BDHS 2014	BDHS 2018	BDHS 2014	BDHS 2018
<i>Goes out without telling husband</i>	29.5	41.8	30.4	38.2
<i>Neglects the children</i>	29.1	41.0	30.7	42.2
<i>Argues with husband</i>	30.1	37.2	28.4	41.9
<i>Refuses to have sex with husband</i>	24.5	26.3	22.0	36.8
<i>Burnt food</i>	21.6	30.4	19.3	39.1

The percentage distribution of young mothers' who received four or more ANC and health-center-based delivery care by demographic and socioeconomic characteristics of the respondents is presented in Table 3. The table shows that young mothers' utilization of four or more ANC and health-center-based delivery care were varied substantially by their attitudes towards domestic violence in all categories, except for ANC use in 2014. Young mothers who had favorable attitudes towards domestic violence were significantly less likely to utilize four or more ANC compared to their counterparts who had opposed attitudes (p-value<0.001), particularly in 2018. Between 2014 and 2018, the utilization rate of four or more ANC was increased 10.5% among young mothers who had a favorable attitude towards domestic violence and 16.8% who had an opposite attitude towards such violence. However, over the same period, the rate of health-center-based delivery

care was increased more among young mothers who had favorable attitudes towards domestic violence (13.4%) than those who had opposite attitudes (9.8%).

Table 3: Young mothers aged 15-24 years who received four or more ANC and health-center-based delivery by demographic and socioeconomic attributes, BDHS 2014 and 2018

Variables	Received four or more ANC				Delivered birth at a health center			
	BDHS 2014		BDHS 2018		BDHS 2014		BDHS 2018	
	%	p-value	%	p-value	%	p-value	%	p-value
<i>Attitude toward domestic violence</i>								
Favorable	30.1	0.146	40.6	<0.001	30.6	<0.001	44.0	<0.001
Opposed	33.2		50.0		43.6		53.4	
<i>Division</i>								
Barisal	26.6	<0.001	37.8	<0.001	27.6	<0.001	44.8	<0.001
Chattogram	28.1		42.3		37.8		49.7	
Dhaka	37.2		50.7		47.6		58.1	
Khulna	39.1		62.1		57.0		64.3	
Rajshahi	30.7		48.1		46.6		57.2	
Rangpur	43.0		52.3		39.2		54.2	
Sylhet	23.1		60.8		24.3		42.8	
Mymensingh	-		37.5		-		44.3	
<i>Place of residence</i>								
Rural	26.6	<0.001	43.2	<0.001	33.3	<0.001	47.7	<0.001
Urban	44.9		59.0		54.7		60.0	
<i>Wealth index</i>								
Poor	20.1	<0.001	37.1	<0.001	22.8	<0.001	36.4	<0.001
Middle	27.7		46.7		38.8		50.9	
Rich	47.2		61.9		58.2		69.4	
<i>Young mothers' educational level</i>								
No Education	11.9	<0.001	20.2	<0.001	21.0	<0.001	25.5	<0.001
Primary	22.7		34.3		28.0		33.7	
Secondary	35.7		51.3		43.5		53.7	
Higher	55.4		64.4		67.7		75.4	
<i>Husband's educational level</i>								
No Education	21.8	<0.001	35.5	<0.001	25.8	<0.001	36.3	<0.001
Primary	33.8		47.5		41.2		50.7	
Secondary	41.7		55.4		54.3		63.7	
Higher	51.6		70.2		67.6		76.6	
<i>Access to media</i>								
No	20.2	<0.001	34.3	<0.001	23.4	<0.001	36.1	<0.001
Yes	39.3		56.2		49.6		60.4	
<i>Decision-making capacity</i>								
No	30.3	0.130	46.0	0.242	39.5	0.689	48.7	0.130
Yes	33.4		48.9		40.3		52.4	
<i>Working status</i>								
No	33.4	0.014	48.3	1.000	42.1	<0.001	55.3	<0.001
Yes	27.2		48.3		29.9		43.8	
<i>Birth order</i>								
Otherwise	26.9	<0.001	41.6	<0.001	28.6	<0.001	39.8	<0.001
First birth	35.4		52.4		46.3		58.8	

There was a significant geographical variation in using four or more ANC and health-center-based delivery services (Table 3). In terms of using health-center-based delivery Sylhet division had been identified as a low-performing area of all divisions for both of the study points (24.3% and 42.8% respectively). Though Sylhet was a low-performing area considering the percentage of four or more ANC utilization in 2014 (23.1%), the situation became worsen for Mymensing in 2018 among all divisions (37.5%). Between 2014 and 2018, rural young women experienced a greater increase in using four or more ANC (16.6%) and health-facility-based delivery care (14.4%) than their counterparts' urban young women, 14.1% and 5.3% respectively. A subclass analysis by wealth status suggests that poor young women were less likely to use four or more ANC and health-facility-based delivery care than rich young women. The highest growth in receiving four or more ANC was noticed among young mothers from the middle wealth quintile by 19.0% (27.7% to 46.7%) followed by poor 17.0% (20.1% to 37.1%) and rich 14.7% (47.2% to 61.9%) between 2014 and 2018. However, the increase in the proportion of health-center-based delivery care was highest among poor young mothers followed by middle and rich young mothers.

Moreover, young mothers and their husbands with higher educational status were significantly more likely to use four or more ANC and health-center-based delivery care than those who had no education (Table 3). Whilst young mothers from all subclass of education were experienced greater use of four or more ANC and health-center-based delivery care between 2014 and 2018, the lowest increase occurred among young mothers with no education, 8.3%, and 4.5% respectively. Also, the utilization of four or more ANC and health-center-based delivery care were found substantially higher for young mothers who had access to media than those who had no such access, in both years. Between 2014 and 2018, four or more ANC and health-center-based delivery care utilization was increased by 14.1% and 12.7% respectively for young mothers with access to media. Surprisingly, employed young mothers compared to unemployed were significantly less prevalent in using health-center-based delivery care in both years. Young mothers were used four or more ANC and health-center-based delivery care more for their first birth compared to any other births. However, there was a 14.7% increase of four or more ANC (26.9% to 41.6%) and an 11.2% increase in health-facility-based delivery care (28.6% to 39.8%) in terms of the births other than the first birth between the two survey waves. However, women's decision-making capacity was not found significant in any of the years for both of the outcomes.

Table 4: Fixed effect of several factors and random effects obtained from multilevel logistic regression model on at least 4 ANC and health-center-based delivery utilization

Variables	At least 4 ANC				Delivered birth at a health center			
	BDHS 2014		BDHS 2018		BDHS 2014		BDHS 2018	
	AOR	p-value	AOR	p-value	AOR	p-value	AOR	p-value
<i>Attitude toward domestic violence</i>								
Opposed	1	-	1	-	1	-	1	-
Favorable	1.11	0.380	0.795	0.065	0.668	0.001	0.803	0.064
<i>Division</i>								
Barisal	1	-	1	-	1	-	1	-
Chittagong	0.743	0.214	0.978	0.919	1.326	0.207	0.861	0.444
Dhaka	1.159	0.536	1.094	0.697	1.915	0.004	1.030	0.886
Khulna	1.415	0.162	2.310	<0.001	3.706	<0.001	1.753	0.008
Rajshahi	0.947	0.828	1.737	0.021	2.509	<0.001	1.453	0.077
Rangpur	2.371	<0.001	3.114	<0.001	1.948	0.005	1.687	0.013
Sylhet	0.876	0.611	1.044	0.857	0.980	0.936	0.924	0.702
Mymensingh	-	-	1.695	0.024	-	-	1.033	0.876
<i>Place of residence</i>								
Rural	1	-	1	-	1	-	1	-
Urban	1.741	<0.001	1.674	<0.001	1.728	<0.001	1.106	0.382
<i>Wealth index</i>								
Poor	1	-	1	-	1	-	1	-
Middle	1.215	0.217	1.128	0.375	1.430	0.015	1.212	0.136
Rich	2.240	<0.001	1.621	0.001	2.140	<0.001	2.198	<0.001
<i>Young mothers' educational level</i>								
No Education	1	-	1	-	1	-	1	-
Primary	1.917	0.019	2.079	0.017	1.048	0.842	1.247	0.421
Secondary	2.852	<0.001	3.158	<0.001	1.283	0.287	1.951	0.014
Higher	4.920	<0.001	3.241	<0.001	1.861	0.035	2.873	<0.001
<i>Husband's educational level</i>								
No Education	1	-	1	-	1	-	1	-
Primary	1.183	0.195	1.363	0.008	1.360	0.013	1.199	0.099
Secondary	1.194	0.416	1.496	0.062	1.601	0.027	1.460	0.072
Higher	1.398	0.094	2.702	<0.001	2.419	<0.001	2.117	<0.001
<i>Access to media</i>								
No	1	-	1	-	1	-	1	-
Yes	1.261	0.089	1.638	<0.001	1.409	0.008	1.566	<0.001
<i>Working status</i>								
No	1	-	-	-	1	-	1	-
Yes	0.846	0.316	-	-	0.631	<0.001	0.731	0.003
<i>Birth order</i>								
Otherwise	1	-	1	-	1	-	1	-
First birth	1.120	0.252	1.181	0.093	1.727	0.001	1.667	<0.001
Intra-cluster Correlation (ICC)								
Null model	0.25		0.24		0.16		0.20	
Full model	0.16		0.15		0.27		0.07	

From the adjusted covariates (Table 4), the lower utilization of healthcare facilities for antenatal and delivery care was found strongly correlated with young mothers' positive attitudes towards domestic violence in both of the survey years. More specifically, young mothers who had a favorable attitude towards domestic violence had 33.2% lower odds of getting health-center-based

delivery care (OR=0.668) in 2014 whereas the odds was lowered by 19.7% in 2018 (OR= 0.803). The utilization of four or more ANC and health-center-based delivery services significantly varied by division. Compared to other divisions, Rangpur experienced greater progress in the utilization of four or more ANC between 2014 (OR 2.371) and 2018 (OR 3.114). However, Khulna division was experienced the highest odds of receiving health-center-based delivery both in 2014 (OR 3.706) and 2018 (OR 1.753). In contrast, the lowest odds (≤ 1) was found for Chittagong among all divisions in both periods in terms of using four or ANC and health-center-based delivery care. Moreover, young mothers residing in urban areas were more likely to utilize four or more ANC in both periods than their counterparts in rural young women. However, the urban-rural difference was significantly reduced in using four or more ANC and health-center-based delivery care over the years.

The odds ratio of four or more ANC and health-center-based delivery care was increased with improved wealth status (Table 4). The same pattern in odds ratio was found by young mothers' and their husbands' educational attainment. These made the fact vivid that household wealth status and higher educational attainment of mothers and their husbands increased their utilization of four or more ANC and health-center-based delivery care. Moreover, access to media had a positive effect in using four or more ANC and health-center-based delivery services. Between 2014 and 2018, the likelihood of receiving four or more ANC and delivering birth at a health-center was increased among young mothers with access to media, from (ORs) 1.261 to 1.638 and 1.409 to 1.566 respectively. Surprisingly, working young mothers were less likely to use health-center-based delivery care (OR= 0.631 and 0.731) in both years than their counterparts non-working young mothers. Moreover, there were 72.7% and 66.7% higher odds of having a health-center-based delivery care in 2014 and 2018 respectively for the first birth of young mothers than the other births.

Table 4 also reported the cluster effect on four or more ANC and place of delivery service utilization based on the random effect for both of the survey years. Firstly, a separate null model was applied for each of the outcome variables to check whether the application of the multilevel logistic model in this study is justified. The result shows cluster variances for both outcome variables. The ICC obtained from the null model in 2018 data for four or more ANC was 0.24

which indicates that 24.0% of the total variation in receiving four or more ANC related to variation between clusters which was slightly low from 2014 BDHS (ICC=0.25). On a contrary, the ICC estimated for the place of delivery from the null model was 0.20 which anticipated 20.0% of the total variation in place of delivery was attributable to the clusters where mothers were residing which was higher than that of 2014 (ICC= 0.16). There was a radical decrease in ICCs obtained separately for both dependent variables from the final model. The cluster variation observed in the null model can mostly be explained by consideration of the effect of independent variables on four more ANC and health-center-based delivery services.

Discussion

This paper uniquely identifies the strong association between domestic violence and the utilization of four or more ANC and health-center-based delivery care along with the presence of cluster variation in Bangladesh. This pattern should be of major concern to achieve universal maternal healthcare coverage, as inequity and domestic violence towards women are important barriers indeed in the use of four or more ANC and health-center-based delivery care. For the first time for Bangladesh to our knowledge, this study uses the most recent BDHS 2018 data along with the data of BDHS 2014 in analyzing the effects of domestic violence on young mothers' four or more ANC and health-center-based delivery care. The overall utilization of four or more ANC and health-center-based delivery care among young mothers has increased by 10.5% and 13.4% respectively in 2018 than that was in 2014. However, the healthcare service utilization for four or more ANC and health-center-based delivery care is found substantially low for young mothers who had justified attitudes towards several reasons of domestic violence. Moreover, the utilization rate of four or more ANC and health-center-based delivery care among young mothers is far behind the targets of 4th HPNSP and SDGs.

The study demonstrates that the utilization of four or more ANC and health-center-based delivery services were increased less over the years among young mothers who had favorable attitudes towards domestic violence than those who had the opposite attitudes. The limited use of four or more ANC in 2014 and health-center-based delivery care in 2014 and 2018 was strongly associated with young mothers' positive attitude towards domestic violence. These findings are broadly found consistent with studies conducted in Asian and African country contexts (21, 22, 48-50). Positive attitudes towards domestic violence of some women are likely to be associated with their inferior

position, negligence and devaluation, submissive nature towards husbands, poor educational status, lack of self-esteem, lower sense of entitlement, lack of awareness about rights, traditional gender norms and practices in Bangladesh (24, 35, 38, 51-53). Therefore, **domestic violence** is an important social as well as public health concern in improving healthcare service utilization for quality ANC and health-center-based delivery care in Bangladesh and some other countries like India, Tanzania, Ethiopia, etc.

Moreover, this study found the presence of cluster variation in utilization of four or more ANC and health-center-based delivery care for both of the survey years which indicates that young mothers of underprivileged communities have inadequate utilization of four or more ANC and health-center-based delivery care. This finding is largely found consistent with a previous study conducted in Ethiopia which reported that mothers who are members of communities with high amenities have greater access to and utilization of healthcare services for WHO-recommended number of ANC visits and hospital-based delivery care than those who live in communities with low amenities. The variations in utilization of four or more ANC and health-center-based delivery services among clusters due to geographic, cultural, and socio-economic differences is another public health concern in Bangladesh that needs to be addressed to make healthcare services more accessible to all women.

The present study suggests that along with domestic violence, multiple socio-economic and demographic covariates are significantly associated with the lower utilization of four or more ANC and health-center-based delivery care. Geographical variation is also found significant for reducing the use of four or more ANC and health-center-based delivery care. Young mothers of rural areas are less likely to utilize four or more ANC and health-center-based delivery care compared to those who are urban residents which is consistent with earlier studies (31, 33, 35, 54). The utilization of four or more ANC and health-center-based delivery services significantly varies with divisions. Further, the utilization rate of four or more ANC among young mothers of Sylhet division has increased remarkably in 2018 which was previously identified as low performing division in terms of using ANC visits (29, 39). However, among the divisions, young mothers of Sylhet division are less likely to utilize health-center-based delivery care which is found consistent with previous studies (55, 56). Possible causes are poor transportation, geographical remoteness, and inadequate

counseling about the importance of health-center-based delivery care (Kamal et al., 2013; Shabnam, 2011).

Our study in line with other study identified that poor young mothers are found less likely to utilize four or more ANC and health-center-based delivery care compared to rich young mothers in both survey periods (35, 40, 57). This finding highlights the fact that despite the socio-economic progress, still Bangladesh is experiencing inequities in the utilization of healthcare services (35). Unlike other studies, we also found that the utilization of four or more ANC and health-center-based delivery care is found associated with young mothers' education and their husband's education which is also identical with earlier studies conducted in Bangladesh (31, 35). Both young mothers and their husbands with a higher level of educational status appear with more awareness and knowledge regarding quality maternal healthcare which increase young mothers' likelihood of using that services for antenatal and delivery care (35, 48, 58, 59). Mass media exposure also contributes to increase young mothers' utilization of four or more ANC and health-center-based delivery care which is also reported in previous studies (31, 36, 58). Mass media is a great source of diffusing information that increases awareness of individuals through behavior change communication and develops a tendency among them to adopt a positive or new behavior.

Surprisingly, employed young mothers in our study are found less likely to utilize four or more ANC and health-center-based delivery in both of the survey years. Despite being employed a few Bangladeshi young women have the liberty to exercise their own decision and ability to spend money for their healthcare. Besides due to shyness, scarcity of female healthcare practitioners, and restriction imposed by husbands and family members many employed young mothers sometimes feel uncomfortable using the WHO-required number of ANC and hospital-based delivery care (16, 23, 33, 38, 51, 60). This study also reveals young mothers with first pregnancy are more likely to utilize four or more ANC and health-center-based delivery care compared to their other births. First pregnancy may be viewed with delicacy due to the new experience and excitement of the married couples which increases their utilization of ANC and health-center-based delivery care, especially for young mothers (33, 54, 61).

Conclusions

The findings of the study demonstrate that though the utilization of four or more ANC and health-center-based delivery care has increased over the years, young mothers with justified attitudes towards domestic violence are less likely to use of four or more ANC and health-center-based delivery care than mothers with opposite attitudes. A strong variation in the clusters, which is identified in our study, is also associated with lower utilization of health services for four or more ANC and health-center-based delivery care. In view of the lower utilization of health services for ANC and delivery care among mothers who experienced domestic violence, the health system of Bangladesh may initiate social campaigning and counseling intervention for young women, their husbands, and other family members highlighting the benefits of using the WHO-recommended four or more ANC and health-center-based delivery care as well as on the health consequences of domestic violence. In light of the variation among clusters, the coverage of the maternity allowance program should be extended, especially in low performing communities, for universal maternal healthcare coverage in Bangladesh (28).

The major strength of our study is the consideration of nationally representative recent two waves of BDHS data (2014 and 2018) to identify the significant relationship between attitudes towards domestic violence and utilization of four or more ANC and health-center-based delivery care among young Bangladeshi women. Moreover, the cluster variations in utilization of four or more ANC and health-center-based delivery care has been assessed rigorously in this study. Our findings suggest that there is a scope of further study to identify the cluster variations in terms of using four or more ANC and health-center-based delivery care considering the community-level features and extending the analysis to a three-level multilevel analysis. The study may have recall bias though the effect of recall bias is minimized by considering the young mothers only who had their last birth in the preceding three years of the surveys. This study using regression outputs identified the associations between the predictors and outcomes measures only, not the causal relationship.

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Conflict of Interest

We declared no conflict of interest.

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